

*Life in the Wyandotte Cave.* By Professor COPE.

An examination into the life of the cave shows it to have much resemblance to that of the Mammoth Cave. The following is a list of the species obtained, which, when compared with that published in the 'Journal' for August 28, will be found to embrace many of the same.

VERTEBRATA.—*Amblyopsis*, sp. (Blind fish).

ARTICULATA.—Insects: *Anophthalmus Tellkampffii* (beetle); *Anophthalmus* No. 2 (beetle); *Staphylinidæ*, sp. 1 (beetle); *Staphylinidæ*, sp. 2 (beetle); *Phalangopsis*, sp. (crickets); *Flies*, 2 species. Spiders: *Aranea*-like; *Opilio*-like. Centipedes: *Pseudotremia*, sp. Crustacea: *Astacus pellucidus* (blind crawfish); ? aquatic species with egg-pouches external; *Lernæidæ*, species parasitic on blind fish, 14 species.

The blind fish is very much like that of the Mammoth Cave; and direct comparison will be necessary to determine any difference, if it exist. It must have considerable subterranean distribution, as it has undoubtedly been drawn up from four wells in the neighbourhood of the cave. Indeed it was from one of these, which derives its water from the cave, that we procured our specimens; and I am much indebted to my friend N. Bart. Walker, of Boston, for his aid in enabling me to obtain them. We descended a well to the water, some twenty feet below the surface, and found it to communicate by a side opening with a long, low channel, through which flowed a lively stream of very cool water. Wading up the current in a stooping posture, we soon reached a shallow expansion or pool. Here a blind crawfish was detected crawling round the margin, and promptly consigned to the alcohol-bottle. A little further beyond, deeper water was reached, and an erect position became possible. We drew the seine in a narrow channel, and after an exploration under the bordering rocks secured two fishes. A second haul secured another. Another was seen, but we failed to catch it; and on emerging from the cave I had a fifth securely in my hand as I thought, but found my fingers too numb to prevent its freeing itself by its active struggles.

If these *Amblyopses* be not alarmed, they come to the surface to feed, and swim in full sight like white aquatic ghosts. They are then easily taken by the hand or net, if perfect silence is preserved; for they are unconscious of the presence of an enemy except through the medium of hearing. This sense, however, is evidently very acute; for at any noise they turn suddenly downward and hide beneath stones &c. on the bottom. They must take much of their food near the surface, as the life of the depths is apparently very sparse. This habit is rendered easy by the structure of the fish; for the mouth is directed upwards, and the head is very flat above, thus allowing the mouth to be at the surface. This structure also probably explains the fact of its being the sole representative of the fishes in subterranean waters. No doubt many other forms were carried into the caverns since the waters first found their way there:

but most of them were, like those of our present rivers, deep-water or bottom feeders. Such fishes would starve in a cave-river, where much of the food is carried to them on the surface of the stream. The *Amblyopsis* belongs, with two other genera of imperfect seers, to the family *Hypsæidæ*, which, with the pike, shore-minnow, and mudfish families, form the order of Haplomi. The shore-minnows (*Cyprinodontidæ*) are their nearest allies, and many of them have the upturned mouth and flat head of the blindfish. One of them (*Anableps*) has the special peculiarity of seeing both in the water and above it,—the eye being enlarged; and a dermal band crossing the cornea, divides it into an upper and a lower portion. This band is the “water-line;” for the fish swims at the surface. Fishes of this or a similar family, enclosed in subterranean waters ages ago, would be more likely to live than those of the other; and the darkness would be very apt to be the cause of the atrophy of the organs of sight seen in the *Amblyopsis*.

Of the other animals, one beetle (*Anophthalmus*), the cricket (*Phalangopsis*), a fly, the *Opilio*-like spider, the centipede, and the blind crawfish are probably the same as those found in the Mammoth Cave. Two beetles and two crustaceans are certainly different from those of the latter, and the centipedes are much more numerous. The Gammaroid crustacean which we found in the waters of the Mammoth Cave, and which is, no doubt in part, the food of the blind fish, we did not find; but some such species no doubt exists, as we found an abundance of a lively little tetracapod crustacean near the mouth of a cave close by. This little creature no doubt inhabits adjacent waters both external and subterranean; but the situation in which we found it is peculiar. It was only seen in water, and near an empty log trough used to collect water from a spring dripping from the roof of one of the chambers.

The Lernæan is a still more remarkable creature. It is a parasite on the blind fish, precisely as numerous species near of kin attach themselves to various species of marine fishes in the salt sea. The Wyandotte species is not so very unlike some of these. It is attached by a pair of altered fore limbs, which are plunged into the skin of the host, and held securely in that position by the barbed or recurved claws. The position selected by the blind-fish Lernæan, was the inner edge of the upper lip, where she hung in a position provocative of attempts at mastication on the part of the fish, and reminding one of the picture of the man on the ass's back holding a fork of fodder before the animal's nose, in illustration of the motto that “persuasion is better than force.” The little creature had an egg-pouch suspended on each side, and was no doubt often brought into contact with the air by her host.

The mutual relations of this cave life form an interesting subject. In the first place, two of the beetles, the crickets, the centipede, the Gammaroid crustacean (food of the blind fish) are more or less herbivorous; they furnish food for the spiders, crawfish, *Anophthalmus*, and the fish. The vegetable food supporting them is in the first

place Fungi, which in various small forms grow in damp places in the cave; they can always be found attached to excrementitious matter dropped by the bats, rats, and other animals which extend their range to the outer air. Fungi also grow on the dead bodies of the animals which die in the caves, and are found abundantly on fragments of wood and boards brought in by human agency. The rats also have brought into fissures and cavities communicating with the cave, seeds, nuts, and other vegetable matters, from time immemorial, which have furnished food for insects. Thus rats and bats have no doubt had much to do with the continuance of land life in the cave; and the mammals, of the postpliocene or earlier period, which first wandered and dwelt in its shades were the introducers of a permanent land life.

As to the Gammaroid crustacean, little food is necessary to support its small œconomy; but even that little might be thought to be wanting, as we observed the clearness and limpidity of the water in which it dwells. Nevertheless the fact that that water communicates with an outside river, is a sufficient indication of the presence of vegetable life and vegetable débris in variable quantities at different times. Minute freshwater Algæ no doubt occur there, the spores being brought in by external communication, while remains of larger forms, as Confervæ &c., would occur plentifully after floods. On this basis rests an animal life which is limited in extent and must be subject to many vicissitudes. Yet a fuller examination will probably add to the number of species, and of these, no doubt, a greater or less number of parasites on those already known. The discovery of the little Lernæan shows that this strange form of life has resisted all the vicissitudes to which its host has been subjected, that it has outlived all the physiological struggles which a change of light and temperature must have produced, and that it still preys on its host's life-blood, as its ancestors did under more favourable circumstances. That the blindness of the fish is favourable to its "success in life" cannot be denied; but that its own sight has been benefited by the change is very doubtful.—*Indianapolis Journal*, Sept. 5, 1871.

*Note on Spongia linteiformis, Esper.* By Dr. J. E. GRAY, F.R.S.

Having sent some specimens of *Spongia linteiformis* from the Philippine Islands, referred to in the 'Annals' for August, p. 142, to Prof. Agardh at Lund, he says:—"I believe it belongs to the genus *Spongocladia* described by Prof. Areschoug in the Acta of the Academy of Stockholm (Öfversigt af Vetensk. Akad. Förhandling. Svo, 1853, no. 2). But the species of Areschoug was from Mauritius, and somewhat different in form. Yours may be, if compared with that, different almost in the same way as *Codium dilatatum* is different from *Codium tomentosum*. It may be named, *ex analogiâ*, *Spongocladia dilatata*, if you wish that the name may indicate some one of its characters."